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GROUND-BASED GPS AS A CALIBRATION/VALIDATION TOOL FOR TROPOSPHERIC SENSING INSTRUMENTS

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The tropospheric sensing capabilities of ground-based GPS have been the subject of intensive validation efforts in recent years. But a maturing GPS technology is now rapidly becoming a valuable calibration/validation tool in its own right. We will describe two applications where ground-based GPS receivers have been used as a calibration/validation tool. The first such case is the Cassini gravitational wave media calibration project. A water vapor radiometer (WVR) will calibrate the telemetry signal from the Cassini spacecraft for line-of-sight wet tropospheric fluctuations. The demanding mission specifications require that the WVR's retrieval of wet delay from measurements of brightness temperature be precisely calibrated. We will describe the results from a special campaign to calibrate the WVR's retrieval algorithm with GPS. The second case involves the Topex/Poseidon microwave radiometer (TMR) which is used to calibrate the altimetric measurement for the effect of tropospheric water vapor. Using GPS data from 1992 to 1997 we detected an anomalous drift in columnar water vapor measurements from the TMR. The TMR's spurious drift implies that the uncalibrated estimate of global mean sea level change from Topex/Poseidon is too low by approximately 1 mm/yr. We will discuss the challenges of using long-term time series and problems relating to using the global GPS network as a calibration tool.

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